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The invention relates to a heat-transfer agent to the transfer of heat between an exhaust gas of an engine of a motor vehicle and a coolant in accordance with the preamble of Claim 1 and/or in accordance with the DE 195 40 683 A1.

With modern, economical internal combustion engines with gasoline or Diesel Direkteinspritzung exists to guarantee in particular during the warming-up phase of the engine, the problem that sufficient waste heat does not become generated, in order a sufficient and rapid heating of the vehicle interior. Remedy against it creates the use of warm ones from the exhaust gas of the engine, which can become this over a separate heat-transfer agent removed and which refrigeration cycle of the engine supplied will, in order to accelerate thereby an heating of the refrigeration cycle with an heater for the vehicle interior, connected to it.

In the magazine automobile development 04/99 is an heating system for the use of exhaust gas heat for the interior of motor vehicles described, removed with which warm one becomes from the exhaust gas of an internal combustion engine, as a flap reroutes the exhaust stream from the known exhaust system. The exhaust stream becomes passed instead of its during the warming-up phase into a second, parallel longitudinal exhaust pipe. In the parallel exhaust pipe, in the following bypass mentioned, is a heat-transfer agent provided, by which cold coolant flows and becomes on the warm from the hot exhaust stream transferred. Such a heated coolant arrives then at the heater, which heats the vehicle interior. After the warming-up phase will the flap again switched and the heat-transfer agents bypassed in order not to subject that to cooling agent-cool to strong with warm ones.

Adverse one to such known heat-transfer agent for exhaust gas is that required for the two parallel longitudinal exhaust pipes an additional building space requirement is in and/or at the vehicle. On the other hand actual depending upon position waste gas valve - which in each case of exhaust gas flowed through exhaust pipe stronger thermal elongations subjected than not flowed through exhaust pipe, so that in the area, in which the two pipes Y and/or t-shaped lie together, strong thermal stresses arise.

From the DE 195 40 683 A1 a heat-transfer agent is known to the transfer of heat between the exhaust gas of an internal combustion engine and the coolant. This heat-transfer agent consists of a bundle of pipes flowed through with exhaust gas, which are washed by the coolant, so that an heat transfer between the exhaust stream and the coolant can take place. This heat-transfer agent is enclosed of an housing, which essentially follows the contour of the bundle.

The invention is the basis the object to train a heat-transfer agent further that in such a manner initially mentioned type that the voltages connected with thermal elongations become reduced and that the building space requirement reduced becomes.

This object becomes 1 dissolved with the features of the claim.

Provided is according to invention that into the housing the heat transfer region an associated bypass passage flow top throughable of a partial flow of the exhaust gas is integrated, which is thermal insulated opposite the coolant, whereby the partial flow is more adjustable variable by means of a placing element. By such an integration of the bypass passage into the housing of the heat-transfer agent the building space requirement for the whole assembly becomes significant reduced. In addition the effort for the assembly of the arrangement from heat-transfer agent and bypass in the motor vehicle reduced becomes, since it can become inserted as complete module in the Abgastrakt. Beyond that the thermal stresses within the bypass range of the exhaust inlets become reduced and/or complete avoided, since Y or t-shaped bypass ranges of the supply ducts complete been void and the heat-transfer agent becomes applied instead of its only over in each case a supply duct and a derivative with exhaust gas, whereby the placing element is likewise into the housing of the heat-transfer agent integrated. Due to the reduced thermal stresses the individual components from a thinner material can be manufactured, which settles in reduced weight and smaller costs. The placing element can take various positions, so that the exhaust stream becomes partial either complete complete by the heat transfer region or by the bypass passage or however - with various ratios to each other - by the bypass passage passed.

In other aspect of the invention are according to claim 2 provided that the bypass passage is fluid tight sealed opposite the heat transfer region by a partition wall. The partition wall ensures mainly for the fact that a propagation of the coolant is limited on the heat transfer region. Beyond that the partition wall can be in such a manner designed that it an undesirable heat transfer between the bypass passage and the heat transfer region prevented, with which the case calculation is supported, desired in which the exhaust gas becomes by the bypass passage passed and is not therefore an heat transfer on the coolant in the heat transfer region.

In other aspect of the invention according to claim 3 provided that in the heat transfer region at least bereichsweise from each other spaced, parallel longitudinal and from the coolant flowed around exhaust pipes are disposed to the guide of an exhaust stream of the internal combustion engine, their ends with the exhaust entrance range and the exhaust withdrawal range are fluid tight connected are. Thus a reliable seal is ensured between the exhaust gas guiding exhaust pipes and around the exhaust pipes flowing coolants.

In other aspect of the invention are according to claim 4 and 5 provided that the flow paths of the exhaust stream are in such a manner in each case designed that the pressure loss of the exhaust stream is during a flow of the exhaust pipes and approximate in each case same during an alternative flow of the bypass pipes, and that in the bypass passage bypass pipes are disposed to the guide of the exhaust stream. By a such arrangement of several bypass pipes within the bypass passage the pressure loss can become during the flow of the bypass passage by choice of the tubing dimensions that of the heat transfer region adapted in each case. In the case of a change-over between the heat transfer region and the bypass this accordance of the exhaust counter-pressure for the engine becomes thus not affected.

In other aspect of the invention are according to claim 6 and 7 provided the fact that the placing element is disposed as exhaust valve in the exhaust entrance range and/or in the exhaust withdrawal range and either the bypass passage or opposite the exhaust entrance opening or the exhaust outlet fluid tight seals the exhaust pipes of the heat transfer region, whereby the exhaust valve is formed as sheet, which is more deformable at that the exhaust entrance range or exhaust withdrawal range of opposite side solid journaled and after type of a bending bar resilient. Thus can be done without an hinge complete.

In other aspect of the invention are according to claim 8 provided that the placing element is more drivable by a thermostat. Thermostat becomes of a propelling phase change substance the necessary adjustment work applied by the volume change. If this substance is flowed around by the flowing coolant and the phase change temperature to the desired switching temperature for the change between the heat-transfer agent and the bypass adapted becomes, then automatic it is ensured that the coolant does not become by heat input as possible from the exhaust gas as rapid desired an operating temperature achieved and after subsequent recovery other warm one from the exhaust gas removed.

Embodiments of the invention are in the designs shown and become in the following more near described.

Here shows:

Fig. 1 a sectional view of a heat-transfer agent according to invention;

Fig. 2 a partial cut representation of the heat-transfer agent of the Fig. 1;

Fig. 3 a partial cut representation of the heat-transfer agent of the Fig. 1;

Fig. 4 a sectional view of a heat-transfer agent with round cross-section area;

Fig. 5 a sectional view of a heat-transfer agent with rectangular cross-section area.

Fig. 1 shows a sectional view by a heat-transfer agent 10 with an housing 12, which encloses the heat-transfer agent. The housing 12 possesses an exhaust entrance range 14, into the exhaust gas from a not represented exhaust system occurs, and an exhaust withdrawal range 16, from which the exhaust gas leaves the heat-transfer agent again. Between the exhaust entrance range 14 and the exhaust withdrawal range 16 an heat transfer region 18 as well as a parallel bypass passage longitudinal in addition are 20 disposed. Both the heat transfer region 18 and the bypass passage possess thereby top a connection to the exhaust entrance range 16 and to the exhaust withdrawal range 18.

Within the exhaust withdrawal range 16 a placing element is 22 disposed, from a single solid clamped, corrugated and flexible sheet 24 exists. This sheet 24 can become over a control drive 26 adjusted, so that the sheet becomes 24 due to the single solid restraint after type of a bending bar elastically deformed. Depending upon position of the sheet 24 either the bypass passage 20 or the heat transfer region becomes 18 opposite an exhaust outlet 28 sealed or an intermediate position set.

Fig. 2 and Fig. 3 shows the heat-transfer agent 10 into partial cut representation. Inside heat transfer region 18 are bereichsweise from each other spaced, parallel longitudinal exhaust pipes 30 disposed, which are washed by a coolant. The coolant becomes 18 introduced over a cooling agent entrance 32 into the heat transfer region and after the flow and a possible heat exchange with the exhaust stream by a cooling agent withdrawal range 34 again derived. Within the exhaust

pipes 30 turbulence-producing flow bodies are 36 disposed in the form of Winglets, which provide for a good mixing of the exhaust gas and prevent possible deposits. A such exhaust gas heat transducer is known from the DE 195 40 683 A1 of the applicant, becomes express taken on which respect. In the bypass passage 20 are bypass pipes 38 to the guide of the exhaust stream admitted, which are in such a manner designed that the pressure loss of the exhaust stream is during a flow exhaust pipes or during an alternative flow of the bypass pipes approximate same. In the area between the heat transfer region 18 and the bypass passage 20 a partition wall is 40 disposed, which represents on the one hand a fluid delimitation for the coolant in the heat transfer region 18 opposite the bypass passage 20, and on the other hand due to let in beads and/or knobs 42 a Beabstandung between that bypass pipes 38 and the heat transfer region 18 cause and thus an unintentional heat transfer decrease.

Alternative one to the geometric shapes of the heat-transfer agent specified above can the heat-transfer agent 10a also, as in Fig. 4 shown, a cross-section area circular in the cross section exhibit, whereby the exhaust pipes 30a are concentric around a central bypass passage 20a guided. The other is, as in Fig. 5 shown, an embodiment possible rectangular in the cross section, with which the exhaust pipes are chessboard-like 30b over the cross-section area divided, whereby some the exhaust pipes 30b by the bypass passage 20b replaced are.

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1. Heat-transfer agent to the transfer of heat between the exhaust gas of an engine of a motor vehicle and a coolant, with an housing (12), which an exhaust entrance opening and an exhaust outlet (28) as well as an exhaust entrance range (14) and an exhaust withdrawal range (16) and between them an heat transfer region (18) encloses, characterised in that into the housing (12) the heat transfer region (18) an associated bypass passage flow throughable of a partial flow of the exhaust gas (20, 20a, 20b) integrated is, which is thermal insulated opposite the coolant, whereby the partial flow is more adjustable variable by means of a placing element (22).
2. Heat-transfer agent after one of the preceding claims, characterised in that the bypass passage (20, 20a, 20b) opposite the heat transfer region (18) by a partition wall (40) fluid tight sealed is.
3. Heat-transfer agents after one of the preceding claims, characterised in that in the heat transfer region (18) at least bereichsweise from each other spaced, parallel longitudinal and exhaust pipes flowed around by the coolant (30, 30a, 30b) to the guide of an exhaust stream of the internal combustion engine disposed are, their ends with the exhaust entrance range (14) and the exhaust withdrawal range (16) fluid tight connected are.
4. Heat-transfer agents after one of the preceding claims, characterised in that in the bypass passage (20, 20a, 20b) bypass pipes (38) to the guide of the exhaust stream disposed are.
5. Heat-transfer agents after one of the preceding claims, characterised in that the flow paths of the exhaust stream in such a manner in each case designed are that the pressure loss of the exhaust stream is approximate in each case same during a flow of the exhaust pipes (30, 30a, 30b) and during an alternative flow of the bypass pipes (38).
6. Heat-transfer agent after one of the preceding claims, characterised in that the placing element (22) as exhaust valve within the exhaust entrance range (14) and/or within the exhaust withdrawal range (16) disposed is and either the bypass passage (20, 20a, 20b) or the exhaust pipes (30, 30a, 30b) of the heat transfer region opposite the exhaust entrance opening or the exhaust outlet (28) fluid tight seals.
7. Heat-transfer agent after one of the preceding claims, characterised in that the exhaust valve as sheet formed is, which is more deformable solid journaled at that the exhaust entrance range (14) or exhaust withdrawal range (16) opposite side and after type of a bending bar resilient.
8. Heat-transfer agent after one of the preceding claims, characterised in that the placing element (22) by a thermostat is more drivable.

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